RESPONSE TO MOTOROLA'S
NOVEMBER 27, 1995
LETTER TO
MR. THOMAS S. TYCX
FCC INTERNATIONAL BUREAU

- Motorola's November 27, 1995 Table 1 assumes a bit error rate of 1.0E-7 at an interference level of -207.5 dBW/Hz. However, the **received feeder link signal level** (per Motorola's Application amendment of November 15, 1994) **of -181.3 dBW/Hz results** in a **C/I ratio of 26.2 dB** which produces a **bit error rate of 1.0E-20.**

  An LMDS and noise composite level of **-189 dBW/Hz** would result in a **C/I ratio** of **7.7 dB** and produce a **bit error rate of 1.0E-8.**

- Motorola's views on sharing analysis:

Item 1.

The results of the TI analysis is valid and is not in error by an order of 20 to 27 dB. Random draw of program parameters for statistical analysis produced C/I results in the 30 dB to 35 dB range. TI does agree that multiple runs of the program and when related to I/N instead of C/I a mean I/N of -17 dB with a 3 sigma peak of -10.7 dB per Dr. Kubik's Figure 8 may be obtained. However, this does not provide the bit error rate performance of the satellite system. That assessment must be accomplished using the C/I ratio.

The simultaneous CPE transmitters used in the TI analysis is the worse case quantity with random pointing angles. It is not valid for Motorola to confine these to a single 90 degree sector.

The 3 dB blocking reduction at low elevation angles (<5 degrees) is not related to power control as assumed by Dr. Kubik, but it represents a conservative estimate of the CPE transmitters that will not have line of sight to a low satellite.

The TI sharing analysis is valid and does show even with the statistical variation that results in the statistical analysis that the desired feeder link performance (bit error rate of 1.0E-7) can be maintained.

Item 2.

There is agreement with the math used to show signal levels in excess of the Motorola interference criteria of -210.5 dBW/Hz. However, TI has pointed out to Motorola at the NRMC and many other times that this criteria is not acceptable for determining system performance capability. Motorola has not been willing to accept that it is not the receiver noise floor level but the system C/I ratio which sets the satellite bit error rate performance levels.

Item 3.

TI agrees that the interference ground rules proposed by Motorola are unacceptable. Motorola was unwilling to consider link performance as a sharing criteria during the NRMC proceedings. Use of C/I and bit error rate performance is not a newly asserted interference criteria.

Item 4.

According to Motorola's November 15, 1994 Table R-A-6 (Rev1) SV-Gateway Links analysis there is sufficient margin in the link to accommodate sharing with out change to the gateway design. In addition, the analysis of Motorola's orbit parameters by Mr. Eric Barnhart shows that the minimum satellite elevation angle in the CONUS is 11.9 degrees (Attachment E of the 28 November 1995 letter from Texas Instruments to Motorola) not 5 degrees as proposed by Motorola.

Item 5.

Feeder link operation 3 dB over threshold allows the desired performance bit error rate to be achieved with I/N's of up to 0 dB, (13 dB increase in interference tolerance). This is consistent with the operation of the system as presented in the Motorola application revision dated November 15, 1994. The noise allocation used by the LMDS proponents did not use contributions from GEO systems since the proposed band plan does not include GEO systems operation in the 29.1 to 29.25 GHz spectrum. This also brings into question the applicability of the FCC Rule 25.204(c) to this issue of sharing between Motorola's Iridium feeder links and LMDS.

Item 6.

The LMDS proponents have offered to reduce the proposed rule EIRP to accommodate Motorola's concerns and have asked that Motorola increase their transmit power above threshold or operate at the levels indicated in the Motorola application since a very small increase in desired signal level results in a very large satellite margin increase. Thus, TI has not placed the entire burden of sharing on the Iridium system but has only asked that Motorola recognize the potential that exist for sharing.

The recommendation to use multiple up link receiving antennas with increased gain at the hubs to reduce subscriber transmit power is not feasible for all LMDS systems. Those systems that have omni coverage and make use of antenna polarization to prevent mutual interference between hubs and within hub coverage can not use higher gain narrow beam antennas as proposed by Endgate Technologies.

Item 7.

Motorola did not discuss sharing with all of the LMDS proponents during the NRMC and was not willing to discuss sharing criteria that would allow both hubs and subscriber terminals to share with the Iridium system. The agreement that was reached during the NRMC was in light of two LMDS operators (A & B) each of which would have 1 GHz of spectrum (27.5 to 29.5 GHz). The TI proposal at that time was to place the subscriber return links at the opposite ends of the 2 GHz for maximum separation to eliminate a costly diplexer in the subscriber transceiver. This proposal would have supported the Motorola sharing arrangement since the subscriber return links would not have been at the Iridium frequencies. However, the NRMC was not able to reach a successful conclusion since a consensus was not achieved. Thus, no agreements resulted from the NRMC to support either the LMDS interest or the satellite interest. Hence, the Third NRMC has resulted in a need to reconsider the possibility of LMDS sharing by the LMDS parties and Motorola.

Item 8.

The sharing agreement that was part of Motorola's input to the NRMC was signed by TI's representatives with the notation to recognize revisions that existed at that time. The basis of the agreement at that date was that LMDS was working to share 27.5 to 29.5 GHz, a total of two GHz of spectrum that supported the TI proposed LMDS spectrum utilization that was presented to the participants of the NRMC. The events as discussed in item 7 has resulted in the band plan which requires TI, the other LMDS proponents and Motorola to discuss sharing to maximize the use of the spectrum.

Item 9.

CellularVision has continued to participate in the analysis of LMDS and Motorola to operate as co-primary in the 29.1-29.25 GHz band. Their most recent contribution is a November 17, 1995 examination of Iridium orbits and gateway elevation angle which shows that for the CONUS the minimum elevation angle to the satellite is 11.9 degrees.

COMMENTS TO MOTOROLA'S
PROPOSED RULES
FOR 28 GHZ
DATED NOVEMBER 27,1995

21.107 Transmitter Power

The various LMDS proponents have commented in their response and reply comments to the Third NPRM on both the power level and the measurement bandwidth.

21.1020 LMDS Suscriber Transmissions

(a) Subscriber Transmitter EIRP Limit: Subscriber-to-hub

The limit of a maximum allowable EIRP per carrier of 0 dBW/MHz in any one megahertz in clear air is 20 dB below that value proposed by the LMDS participants. This level is 8 to 16 dB below that level specified for operation by the various LMDS proponents, (CV, ET, HP and TI).

It is suggested that the LMDS proposed rule power level can be reduced if Motorola will recognize the higher operating level specified in their application. If Motorola will increase their operating power level above minimum thresholds, as a minimum 1 dB for every 1 dB decrease in the LMDS proposed power level of 20 dBW/MHz, then the sharing between systems should be feasible with sufficient margin to protect the MSS/FSS feeder link integrity.

(b) Hub-to-Subscriber transmission

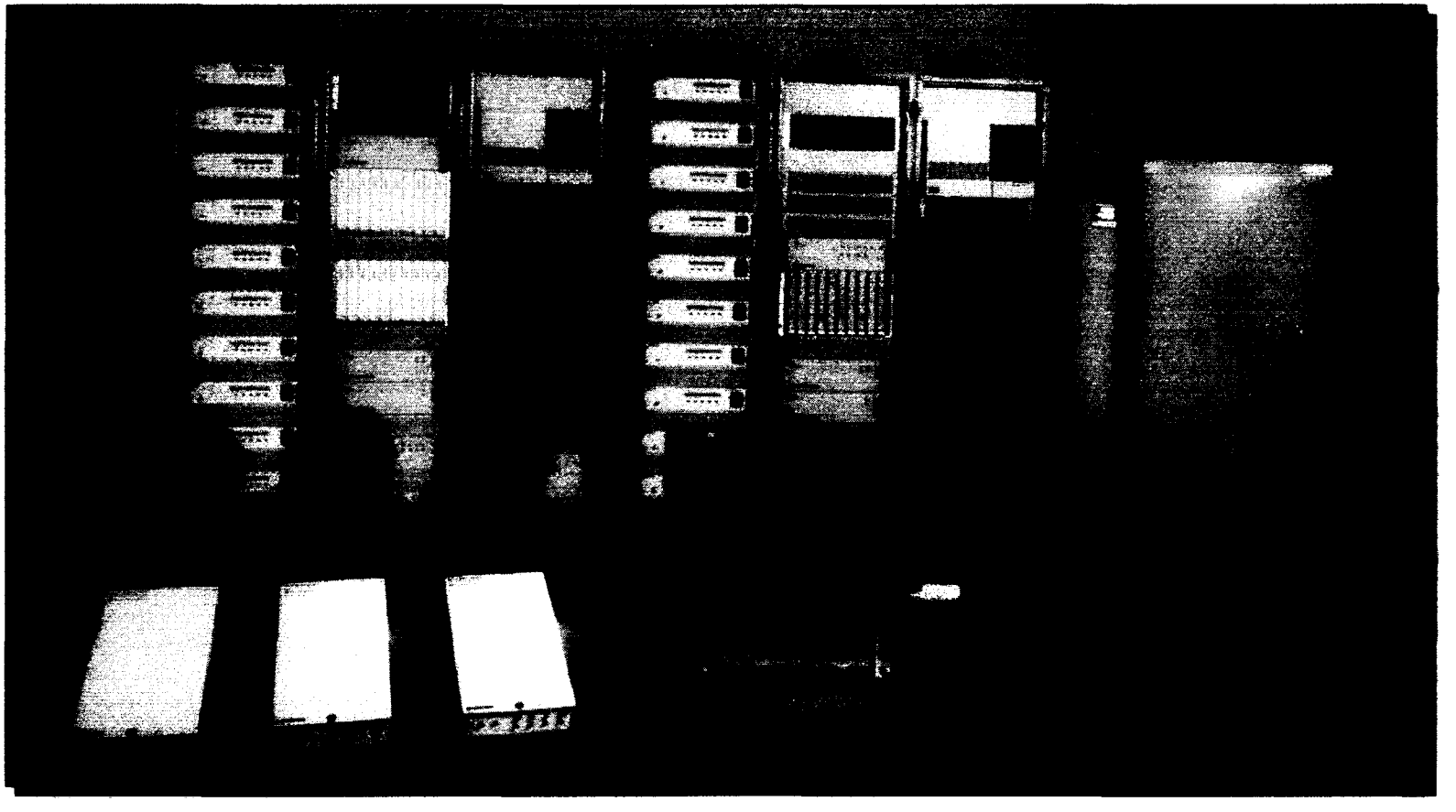
Hub to subscriber transmission on these frequencies should not be excluded unless they are used for subscriber transmission within a particular hub cell.

(c) Transmitter Interlocks

Some of the LMDS participants have shown that the random nature of CPE pointing angles of CPEs is not harmful to the satellite feeder link operation. This proposed rule should be imposed only if it can be shown that a particular system's operating power level and antenna characteristics can be shown to cause harmful interference.

The proposed rule amendments to 47 C.F.R. Part 25 of the Commission's Rules, (a) Special requirements for operation in the band 29.1-29.25 GHz and (b) Coordination of LMDS systems.... require further review and discussion.

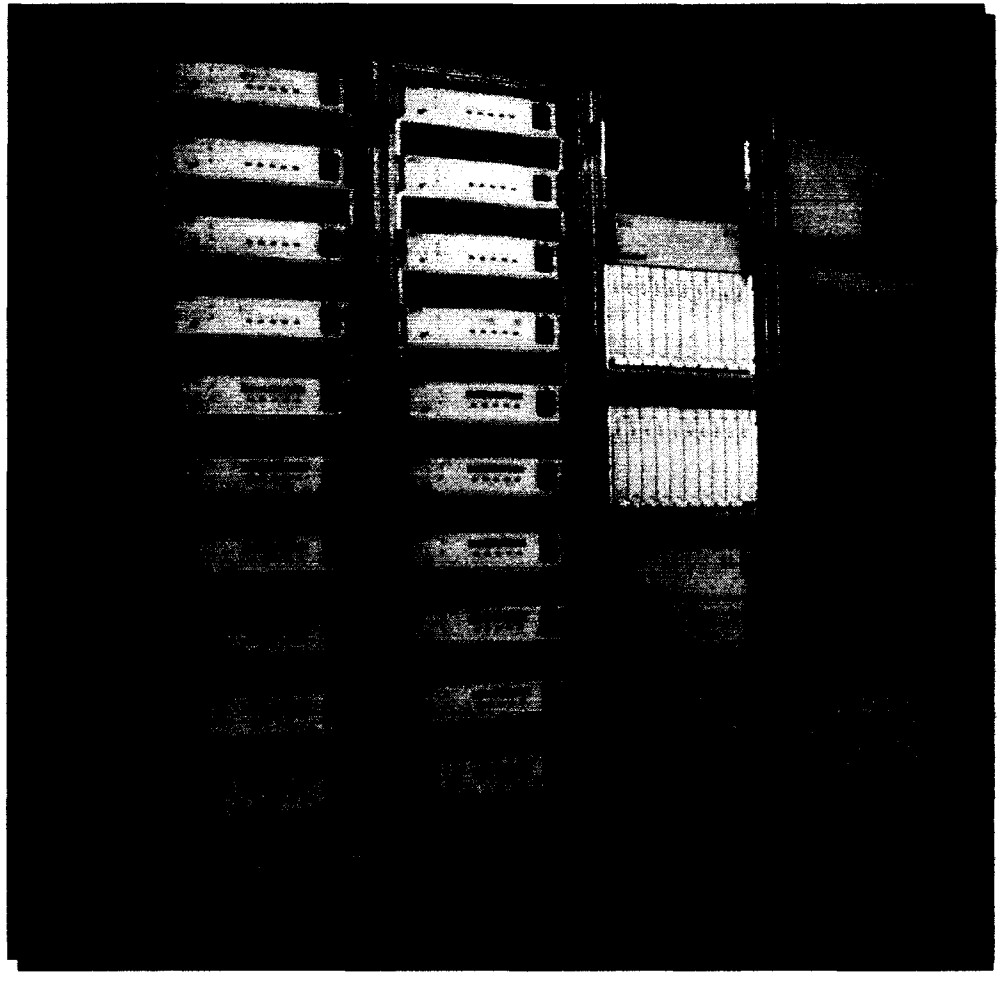
MULTIPOINT™ Video System



- Video RF Headend
- Headend-to-Node Fiber Optic Transport
- TWT and SS Node Tx/Rx
- CPE Roof-Top-Unit Tx/Rx
- Network Interface Unit (NIU)
- Network Element Manager (NEM)

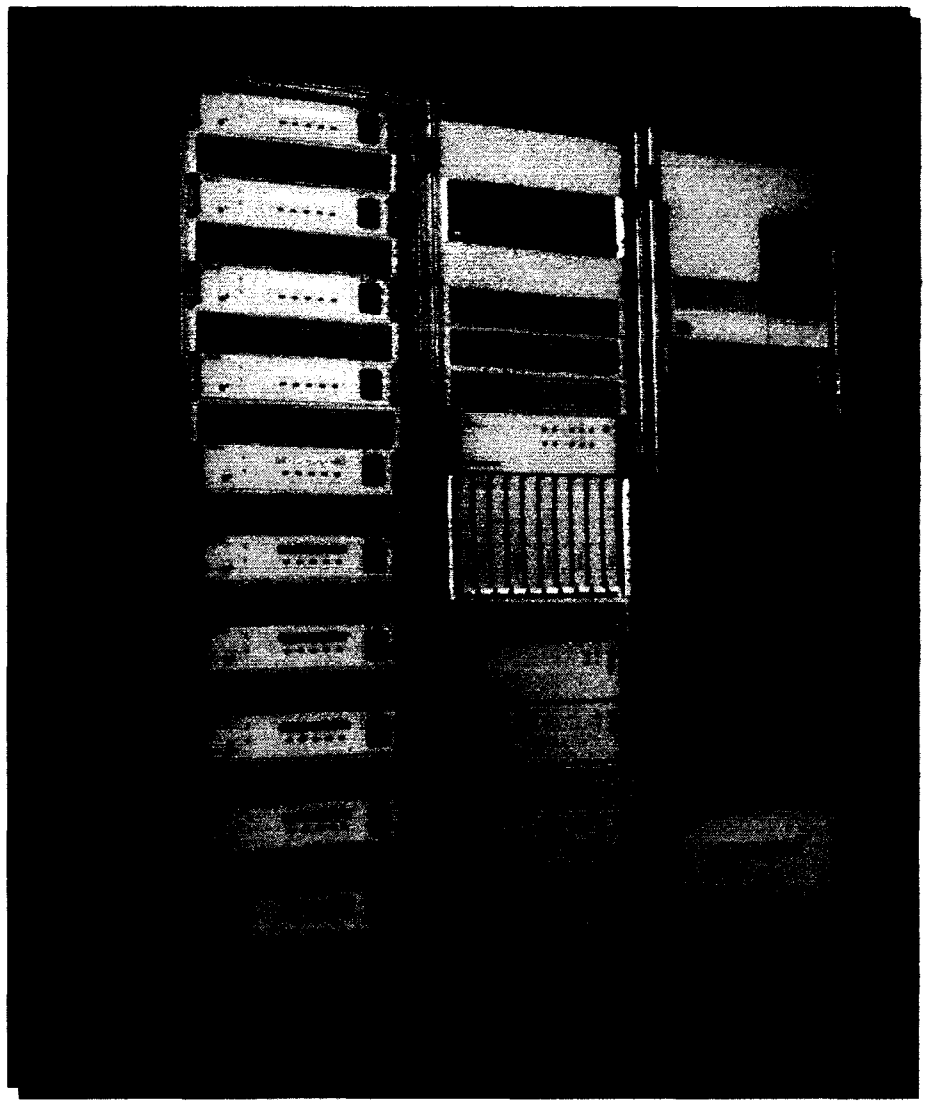
529301wF

MULTIPOINT™ Video Control Office



- Broadcast Video Services (160 MPEG2 TV Channels)
- Optical Splitter Interface to HFC MPEG2 Data Stream
- 20–30 MHz each QPSK Modulators (8-MPEG2 TV Ch/Modulator)
- L-Band Upconverter (per QPSK Modulator)
- Headend to VSO Fiber Optic Transport (2 analog fibers)
- Network Element Manager (NEM)

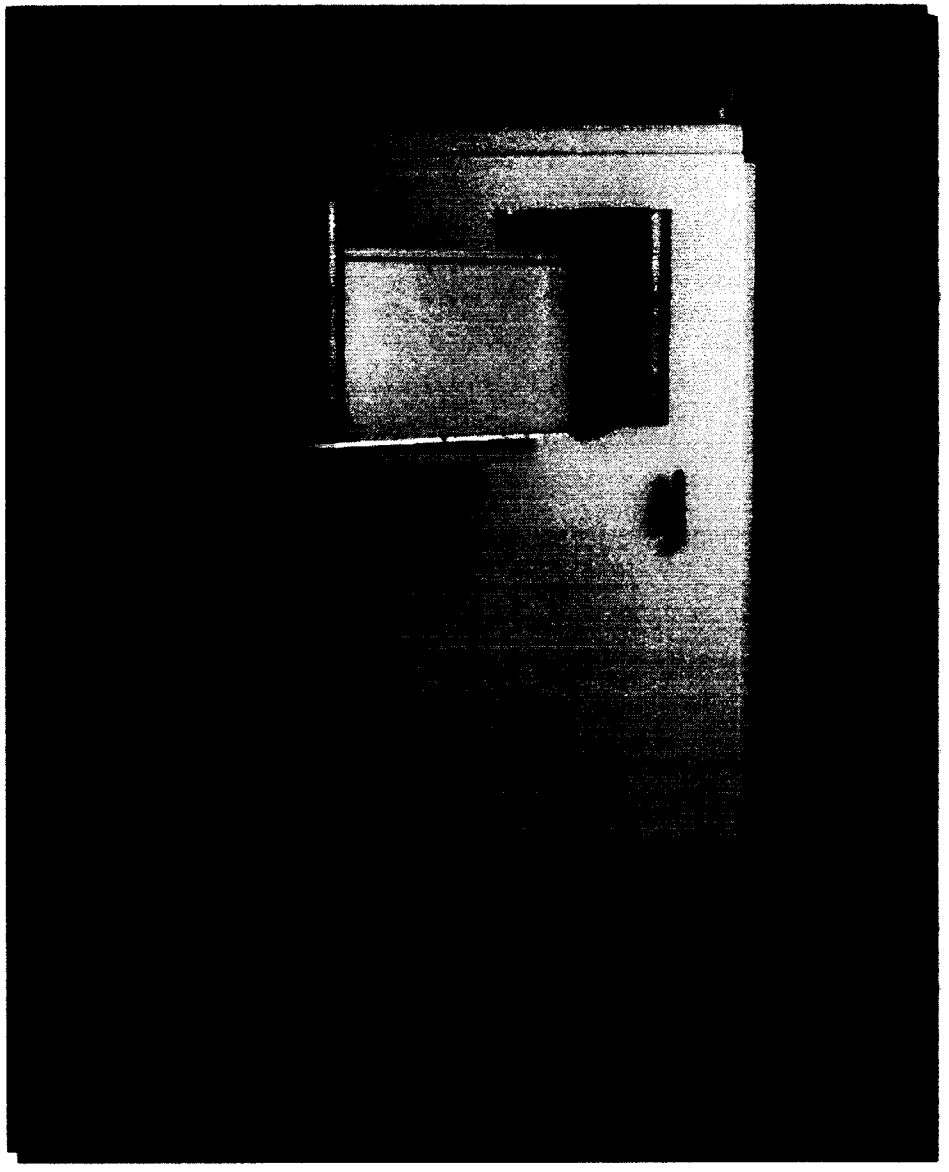
MULTIPOINT™ Video Serving Office



- Interactive Video-on-Demand Services (32-MPEG2 TV Channels)
- 4–30 MHz each QPSK Modulators (8-MPEG2 TV Ch/ Modulator)
- L-Band Upconverter (Per QPSK Modulator)
- Headend to/from Node Optical Transport (5 analog fibers)
- Network Element Manager (NEM)

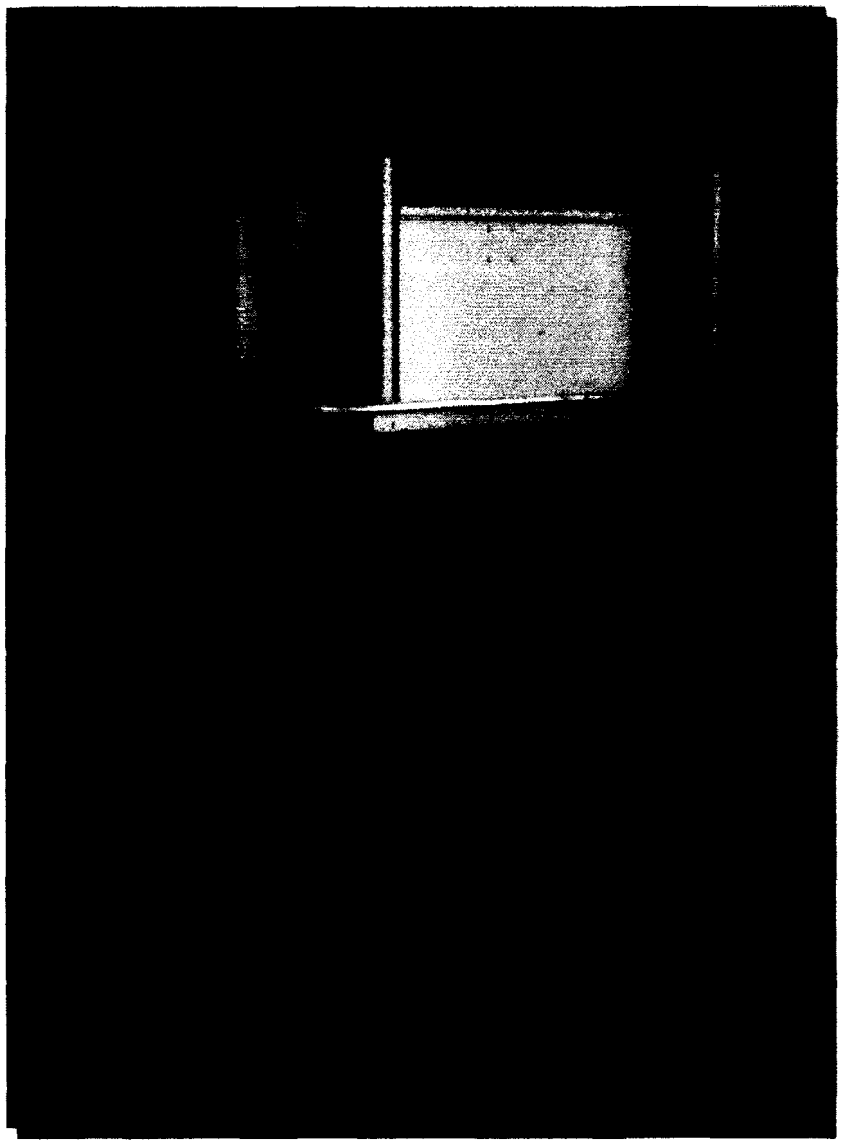
529303wF

MULTIPOINT™ TWT Node



- 28 GHz TWT Transceiver
- 5 Kilometer Cell Size
- 90° Sector Coverage
- Polarization Diversity
- Tower Interface Unit with Fiber Optic Interface to Headend
- Network Element Manager (NEM)

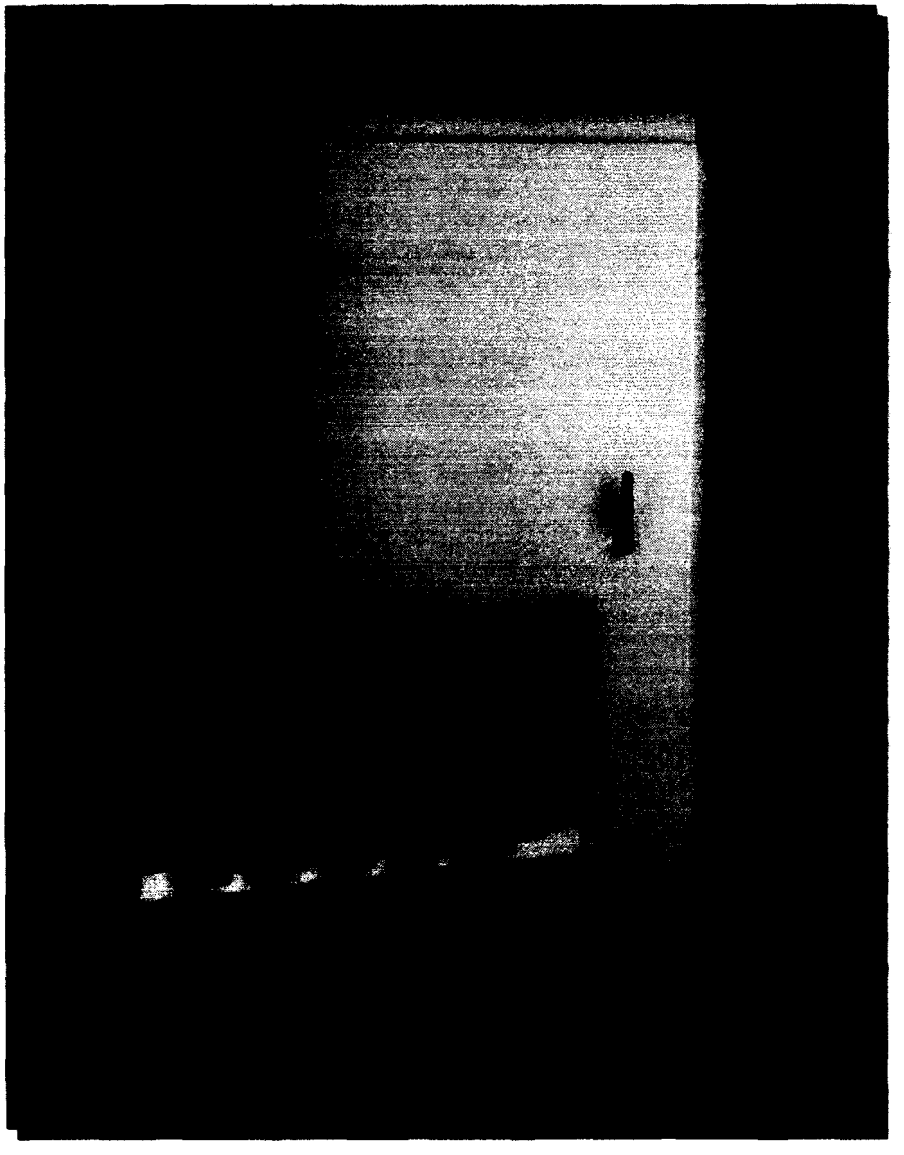
MULTIPOINT™ TWT Node Transceiver



- 28 GHz Transceiver
- 90° Sector Coverage
- 12 dB Gain Antennas
- 5 Kilometer Cell Size
- Polarization Diversity
- Fiber Optic Interface via TIU

529305wF

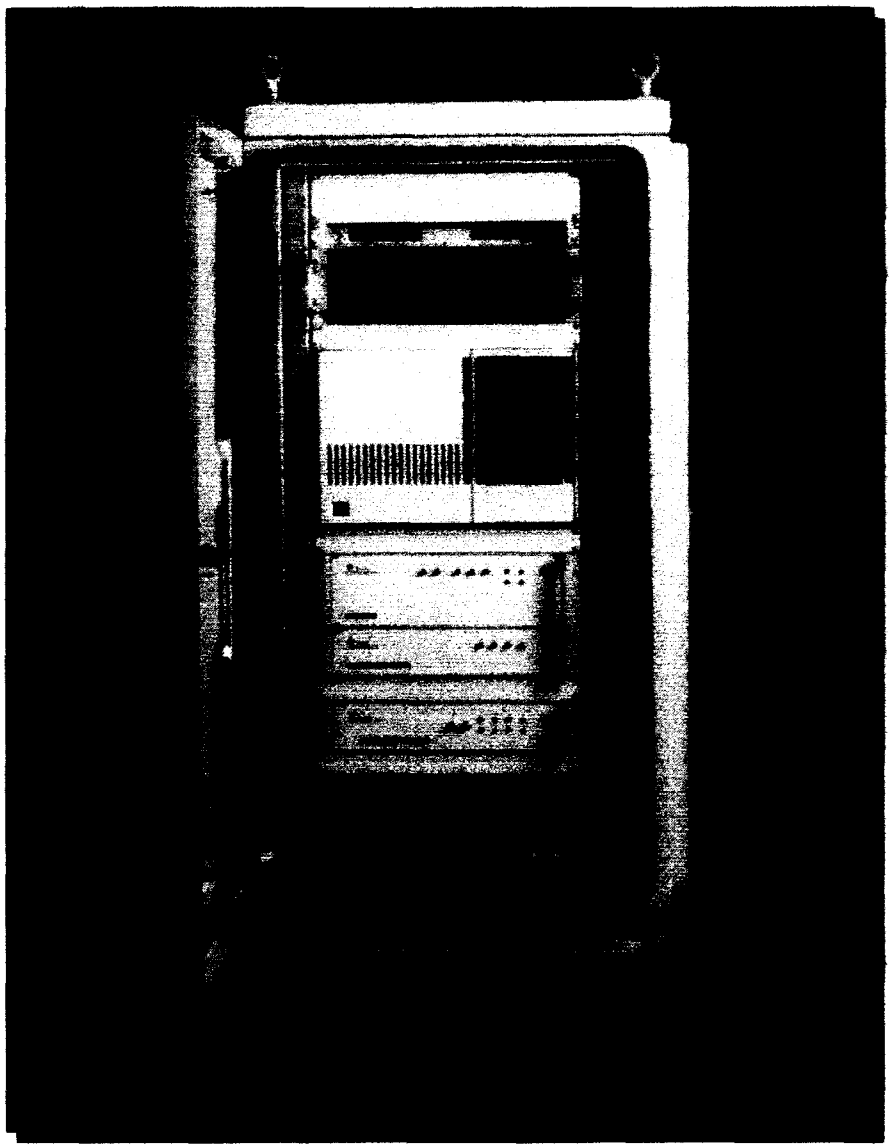
MULTIPOINT™ Solid-State Node



- Modular 28 GHz RF Carriers
- High Reliable SS Power Amplifiers (30 dB output)
- 30 MHz Bandwidth Transmitters
- Narrowband Receivers
- 90° Sector Coverage (12 dB Gain)
- 5 Kilometer Cell Size
- Polarization Diversity
- Tower Interface Unit to Headend
- Network Element Manager (NEM)

529306wF

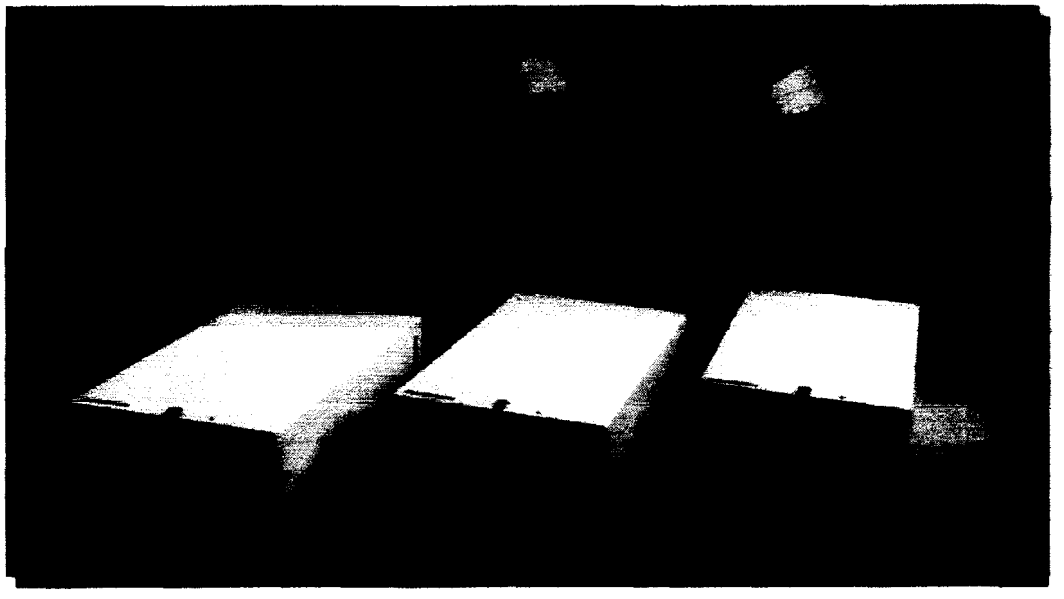
MULTIPOINT™ Tower Interface Unit



- Roof Mounted Equipment
- Fiber Optic Interface to Video Headend
- TWT Power Supplies
- Network Element Monitor

529307wF

MULTIPOINT™ Customer Premise Equipment



Roof-Top-Unit (RTU)

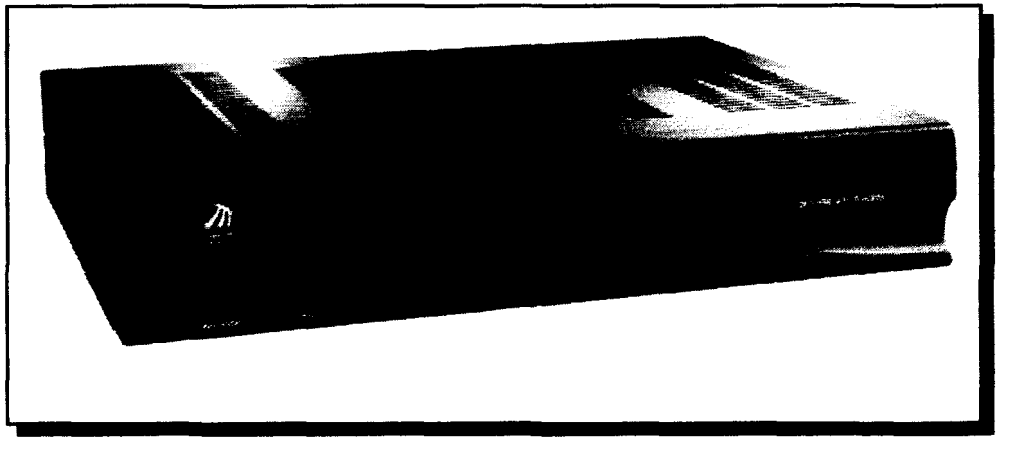
- 12 Inch Reflector (34 dB Gain)
- 20 dB Transmit Power Upstream
- Polarization Diversity
- Block Up/Down Converters
- Radome-Weather Protection

Network Interface Unit (NIU)

- Video and Control I/F to STB
- 1x4 Splitter (1-4 STB)
- Power Supply for RTU

Set-Top-Box (STB)

- User Remote Controller
- QPSK Tuner/Demodulator
- MPEG2 Decoder for Digital Video
- VOD and NVOD Video Services
- Two-Way Signaling/Control



529308wF